Key principles of multi storey farming

A bigger engine – above and below
MSF offers substantial productivity improvements through the optimal use of soil resources and sunlight. The combination of shallow and deeper-rooted perennial species means that both topsoil and subsoil reserves are used. Photosynthetic capacity is increased through different storeys of vegetation that can attain heights of 15m plus!

Compounding shade and shelter benefits
MSF offers significant shade and shelter benefits that can improve production levels and increase the length of a growing season. These advantages apply not only within the MSF land unit, but also on adjacent paddocks.

True integration through intelligent design
MSF is unique because it places equal importance on agriculture and trees, and offers true integration with each sector benefitting the other. The design of the system is critical to maximising its potential. Tree spacing and species, agricultural system selection and livestock management need to match site type, landscape and capability for the objectives of the client to be realised. For example, whilst silvertop *"Eucalyptus sieberi"* is an excellent timber growing option for many areas of Gippsland, it is not suited to soils prone to periodic waterlogging. In a well-designed MSF system, something is always growing.

You don't have to be big to be successful
MSF works on both large and small-scale farms. MSF has the potential to significantly increase productivity and profitability per hectare, potentially making smaller enterprises more sustainable and viable.

Plan beyond the next election
MSF is a dynamic system that changes as the trees grow. Therefore initial planning needs to consider how the system might function in 20 years time when trees are close to their final size. For example, during early years, crops can be grown between the trees and later be replaced by more shade tolerant, perennial pasture systems that continue to provide productive livestock management options adjacent to large trees.

Design to meet your capability
A MSF system can be labour intensive. It is imperative that you design your MSF system to meet available technical, financial and time resources. Design options are only limited by your imagination, however the success of your design will be limited by the practicalities.

Appreciate trees for what they are
Trees are renewable assets that have been placed on this earth for many reasons. One of those is to help us manage our farmland in a sustainable, productive, fruitful and enjoyable fashion. Don't sell them short. If you have experienced trees as a liability, ask yourself - why have they become a liability? How can they be an asset? Then follow through on plans that make trees the asset they can potentially be.

Know and look after your soil first
All soil based farming systems require healthy soil to attain optimum results. MSF is no different. To achieve the potential of this system, soil structure and mineral reserves must meet the requirements of the plants being grown and livestock being raised. Soil samples must be taken and imbalances must be identified and rectified before starting the journey.

Learn to walk before you run - crops and pastures before trees
Establishing the crop or pasture storey before the trees is recommended to achieve the desired results. This offers early cash flow/s and provides the opportunity to rectify soil imbalances or crop/pasture issues without the influence of the tree storey. A well developed pasture/crop can offer substantial benefits for newly planted trees (e.g. shelter, N fixation, less difficult competition etc.)

Weed control
It is vital that the site is free of noxious or problem weeds, before trees are planted. If you choose to use herbicides, be aware that they may be detrimental to your target crop, pasture or trees.

Continuous management is vital
MSF is not designed to be established and then forgotten. It is a system that is always changing. It requires continual monitoring and adaptive management to achieve the best outcomes. Poor management will lead to poor outcomes.

What next?

To inspect a MSF demonstration site, or for more information about multi storey farming, please contact the Westernport Catchment Landcare Network on info@wpcln.org.au or visit www.wpcln.org.au for further information.

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Practical Landcare Guide Multi Storey Farming

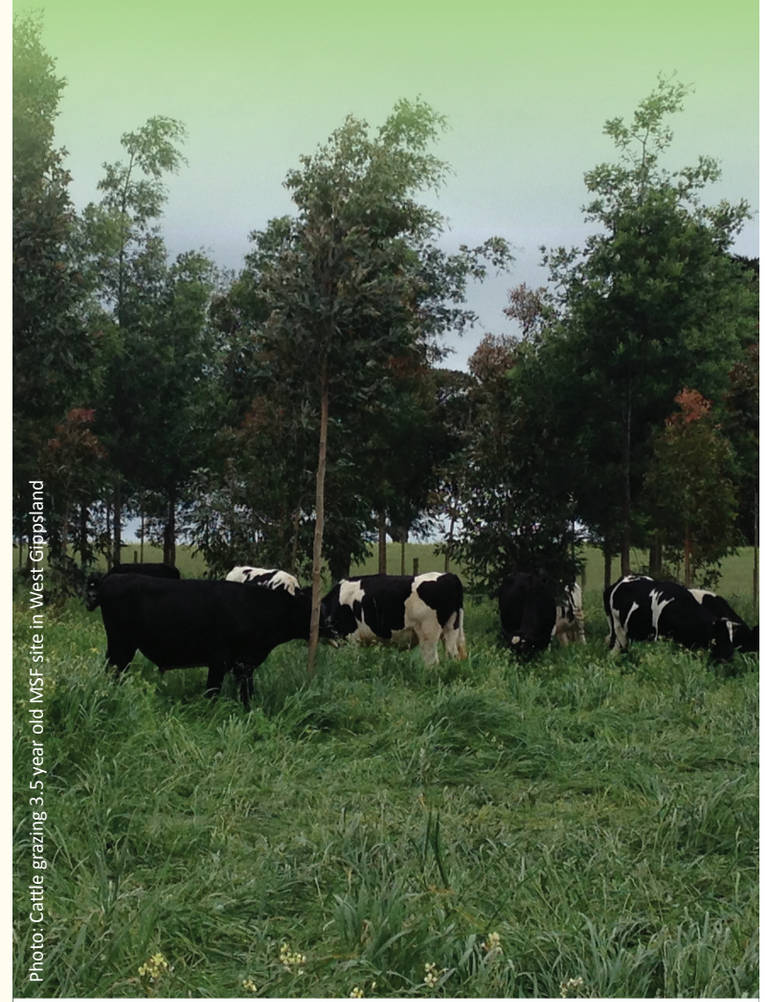

Photo: Cattle grazing 3.5 year old MSF site in West Gippsland

Integrating different 'storeys' including; soil, pasture/crops, livestock and trees on one land unit to create a diverse system with increased production opportunities.

Introduction

The term “multi storey farming” has its origins in forestry. A forest approaching maturity is typically comprised of layers, commonly referred to as “storeys”. In such forests, the upper storey is comprised of the tallest trees; the middle storey comprised of smaller trees and tall shrubs and the understorey contains small shrubs and groundcovers. Moving from upper to understorey the level of light is progressively reduced, and shelter and humidity increase. These gradients of change contribute to the dynamic state of species composition within each storey as the forest develops. This is because each plant species has a preferred niche (or space) that is influenced by the changing environment around it. Like storeys of the forest, the storeys within a multi storey farming (MSF) system change with time and require informed management to optimise the output and health of the system.

Multi storey farming (MSF) integrates different ‘storeys’ or ‘layers’ which can include soil, pasture/crops, livestock and trees on one land unit. This creates a diverse system with a range of production opportunities over the short, medium and long term.

MSF involves planting trees at wide spacing into an agricultural landscape - typically pastures or crops. The wide spacing facilitates the development of, or continuation of, agricultural operations (e.g. silage/hay harvest, cropping, grazing with livestock) between the trees.

It is a flexible option that can be tailored to the needs of most farms. Tree species, planting design, pasture and crop types can be modified to suit different landscapes and farming systems.

MSF is a dynamic system that changes as the trees grow. For example, during early years, crops can be grown between the trees and later be replaced by more shade tolerant, perennial pasture systems that continue to provide productive livestock management options adjacent to large trees.

MSF is unique because it offers true integration by placing significant importance on both agriculture and forestry with each sector benefitting from the presence of the other. To optimise the benefits offered by this integration, it is advantageous to firstly view and then plan multi storey farming as an investment in the long term future of your farm

Why consider multi storey farming?

MSF offers substantial productivity improvements through optimal use of soil and sunlight resources and increased levels of shelter and shade. MSF gains these advantages by focusing on the following:

1. Developing and maintaining a healthy and productive soil;
2. Using both the topsoil and soil at depth (subsoil);
3. Increased photosynthetic capacity through integrating multiple storeys of vegetation;
4. Establishing species of vegetation that provide mutual benefit.

Early income generation
Income from cropping or pasture based harvests are achievable within 12 months of establishment. Such income is invaluable in offsetting or covering other costs (e.g. nutrition, seedlings and planting) associated with starting MSF.

Income planning
MSF can be designed to provide income in the short (<12 months), medium (1-5 years) and long term (5 years plus). For example, crops and pastures can be grown to address short and medium term income requirements. Trees grown for wood, timber, fruit or nuts can address longer term income requirements. Ultra long term options such as black walnut (50 years +) can be established as a resource for future generations.

Value adding
MSF adds value to conventional farm tree planting by creating opportunities to produce wood and food products. The wider spacings between rows and at row ends are designed to be tractor friendly to facilitate easy management.

Grazeable windbreaks
Grazeable areas protected from climatic extremes can be achieved within 18 months after establishment. Trees protect pasture (and crops) from desiccation and wind damage, creating opportunities for increased production and an extended growing season. Shelter and shade can reduce animal stress and livestock losses in extreme weather conditions. Additional products such as firewood, fodder, durable farm timber, and edible produce (e.g. fruit or nuts) can also be grown.

Ecosystem development
The establishment of MSF provides an additional storey of vegetation that offers a wide range of ecosystem services such as improved water quality in streams and dams, salinity mitigation, reduction in erosion and wind damage, and new habitat opportunities for flora and fauna. Tree management (silviculture) activities such as pruning and thinning, produce woody debris that can provide habitat and food sources for a range of organisms. Mulching woody debris decreases breakdown time and can improve soil biology.

Carbon farming
The inclusion of trees within MSF, and the focus on building soil health, enhances carbon farming credentials and subsequent revenue options. Through the process of photosynthesis, plants sequester CO_2 from the atmosphere, producing oxygen and storing carbon. About 50 per cent of the dry weight of wood is carbon. When trees are harvested and used to make wood products, the carbon remains stored in the wood for the life of the product.
In soil, carbon is the energy source that sustains the biological community. Soil carbon can be increased by including trees and other deep-rooted perennials into farming systems because they have a higher root to shoot ratio than annual crops and grow for a longer proportion of the year. In addition, plant residues generated by tree management activities such as pruning and thinning, can be mulched to provide a ready food source that can help build soil biology and enhance overall carbon levels.

Cost reduction
The design of MSF makes it easier to access the site and control pest plant and animal problems commonly associated with tree plantings. Wider spacing to fences reduces maintenance requirements.

Fire protection
MSF systems can be designed to minimise the risk of fire damage through the establishment of deep rooted summer active pastures, wide spacing of trees and using management techniques such as “lift pruning” to separate the tree canopy from ground fuels. Using these techniques, areas traditionally used for firebreaks can offer production options through the summer period. Plantings can also be designed to reduce wind speed and therefore the rate of spread of a fire.

Risk management
MSF uses both top soil and subsoil, livestock and plants (pasture/crops and trees) to create a resilient land use system that can maintain production in adverse conditions. The capacity to produce a diversity of products can improve farm cashflow through increased market opportunities.

Aesthetics
A well-managed multi storey farming system looks great and is a pleasant place to work in.

Microclimates
The integration of wide spaced trees into a farming system can change conditions within a particular land unit by increasing humidity and reducing evaporation via wind protection and prolonged exposure to direct sunlight. Consequently, microclimates can develop that provide opportunities to grow niche crops. Livestock enterprises can also benefit at particular times of year from increased levels of natural shelter (e.g. lambing, sheep off shears and protection for young cattle).

Photo: Red clover growing in MSF site in west Gippsland